REVIEW

Systematic review: risk sexual behavior, sexually transmitted infections, and adolescent pregnancy prevention interventions

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Abstract. In many countries, there is a high number of teenage pregnancies, Sexually Transmitted Infections (STIs), and unsafe sexual behavior, so there is a need for adolescent health intervention programs to change behavior. The effectiveness of comprehensive interventions in various contexts to reduce teenage pregnancy, STIs, and related sexual risk behaviors is reviewed in this systematic. This study aimed to identify risk sexual behavior, sexually transmitted infections, and adolescent pregnancy prevention interventions. Literature search strategy from January 2008 to December 2022 through electronic databases. Key words 'teenage prenancy' OR 'teen pregnancy' OR 'pregnancy adolescence', AND 'maternal education', AND 'randomised clinical trial', AND 'risk behavior'. Articles that were deemed worthy of following the PRISMA guidelines were 28 articles. Most studies looked at school-based, individual, community, clinic, and family-based care. Most studies were followed up after intervention at intervals from one month to seven years, and the majority of the population and sample were adolescents with ages ranging from 13 to 18 years. Implementation of research in urban, suburban, and rural areas. This program has proven successful in preventing pregnancy, contraceptive use, STI and HIV, sexual behavior, dropping out of school, knowledge about pregnancy, sexuality, attitudes towards sexuality, intention to change risky sexual behavior, self-efficacy, and increasing parent-children. This article describes some basic trends in adolescent pregnancy prevention interventions in several countries that can be used as a reference for health programs. Unproven effectiveness can be implemented in conjunction with other interventions that have a high-quality impact.

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Introduction

High rates of teenage pregnancy, Sexually Transmitted Infections (STIs), and related risky sexual behavior are a problem in many countries, whether in industrialized, middle or low-income countries (1,2). Nearly 40% of students who are sexually active did not use a condom during their most recent sexual encounter, and 24% of high school students in the United States reported having four or more partners (3). This behavior increases the risk of pregnancy and STIs, including HIV. Worldwide, approximately 16 million girls aged 15-19 years and 2 million girls younger than 15 years give birth each year (4). In addition, 50% of women aged 20-24 years in Asia and Africa are married at the age of 18 (5). Pregnancy rates are very high, leading to dropouts, so myths and prevailing societal norms contribute to teen pregnancy overall. This is a threat to mothers and newborns because adolescents are physically immature and do not yet have reserves of nutrients that can cause anemia (6).

Health intervention programs for adolescents have concluded that health education is effective that influencing behavior, although the evidence exists mostly from quasi-experimental studies, observational rather than randomized trials (7). This systematic review is a review of various interventions in various settings carried out in various countries for the prevention of teenage pregnancy, STIs and related risky sexual behavior. for example, comprehensive sex education programs (8,9). school-based prevention programs (10-22), youth development programs in the community (23,24), or media-based approaches (25-29). Each intervention has a slightly different approach, although the study design is the same, namely using different randomized trials with several existing review results, most of the reviews used quasi-experimental and observational studies. This demands a rigorous review to more clearly explain the effects of these interventions so that policy makers and practitioners need practical guidance in identifying intervention programs that need to be considered in wider dissemination to reduce teenage pregnancy, STIs, or sexual behavior.

Materials and methods

To methodology of this review followed the guidelines of the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA).

Eligibility criteria. Relevant studies, all describing programs to prevent teenage pregnancy, STIs and related risky sexual behavior. Criteria include:

a. Using a randomized trial design
b. One of the outputs is considered relevant to the evaluated results, namely the intervention to prevent teenage pregnancy, STIs and related risky sexual behavior.
c. The control group for the intervention was obtained from the non-intervention group.
d. This article describes interventions in all low, middle, or high-income countries.
e. Research that has been published in international journals indexed by Scopus in the period January 2008 to December 2022.
f. The sample in the study is teenagers.
g. Articles in English.

Information sources. The search used data from electronic databases, namely Cochrane, Medline, Elsevier, science Direct, and ProQuest, and Pubmed, in the search period published in journals for 14 years from January 2008 to December 2022.

Search strategy. The strategy was developed using a combination of vocabulary. The search strategy was developed using the keywords 'teenage prenancy' OR 'teen pregnancy' OR 'pregnancy adolescence' AND 'maternal education' AND 'randomised clinical trial' AND 'risk behavior'.

Fig. 1. Explains that the study process is divided into several stages.

a. Judging from the title and abstract even though it is against the inclusion criteria.
b. Duplicate articles were excluded from the study process.
c. Using full paper in detail to show those who meet the inclusion criteria.
d. Conduct a feasibility study with various data from intervention studies, grouped according to the decision-making method derived from several articles.
e. After going through the process, there are 70 articles that are complete and assessed for feasibility, and 30 of them will be reviewed.

Data item. We extracted data on the first author, year of study, intervention location, population and sample, study method, program results findings and an assessment of the quality of the feasibility of the article. Some of these extracted data have been presented in tabular form in the 'Results' section.

Quality assessment. The assessment uses a modified version of the rating tool, which is used for the assessment, each having a high, medium, or low mean value according to the risk of bias of the study effect. The highest quality rating was provided for the randomized control trial design with no low sample size, no regrouping of samples in the intervention and control groups and no differences in timing or manner of data collection in the intervention or control groups. A cluster randomized trial should be conducted in at least two groups (schools, classrooms, districts, blocks and so on) grouped into either the intervention or control groups (30-32).

Synthesis methods. The main findings of the studies were analyzed and summarized narratively. In addition, a synthesis was provided with the information presented in the text and table to summarize and explain the characteristics and results of the included studies.

Results

The results of the search and selection of articles in this study were carried out according to the Systematic Review stage which refers to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) method. The chart of the article search and selection process can be seen in Fig. 1. Quality assessment is also carried out by assessing the research results and biases from the literature reviewed in this study. Quality assessment in this study is to use Critical Appraisal Tools in the form of Critical Appraisal Skills Program (CASP) Checklists. The Critical Appraisal Skills Program (CASP) includes an assessment of the types of qualitative and quantitative data consisting of 10 questions with the following scoring system:

1. High-quality paper: >9.
2. Moderate-quality paper: score 8.5-7.5.
3. Low-quality paper: score 7-6.5.
4. Exclude: score <6.

The scientific articles in this study have the quality with the categories of High-quality paper and Moderate-quality paper. The results of the identification of the article's feasibility assessment are attached in the Appendix (33).

Study characteristics. Identification was carried out on articles that totaled more than 12,774 original articles through an electronic database search of 13,438 articles (Fig. 1). Excluded that were not appropriate after reading the titles and abstracts of 12,774 articles and there were 663 article duplications, so that the articles that were assessed for eligibility were 70 articles with 28 articles meeting the inclusion criteria for review.

Included studies include impact for sexuality education programs defined in general terms as curriculum-based programs that provide general information about teenage pregnancy, STI prevention, risky sexual behavior including the use of contraceptives. Other studies examine abstinence-based programs, clinic-based programs that provide individualized services, youth development programs. Programs are mostly based in school (11-22,34), community (24), society (18,26-28,35-38), health care (34,39,40), and family (40-42) or media-based approach (26-29). Among the programs in schools, implemented in elementary, secondary and tertiary schools. The study included samples of mixed sex (adolescent girls and boys) (11,15-19,21,27,28,34-36,38-41,43), among the focus on single sex studies, namely males (12,24,26)

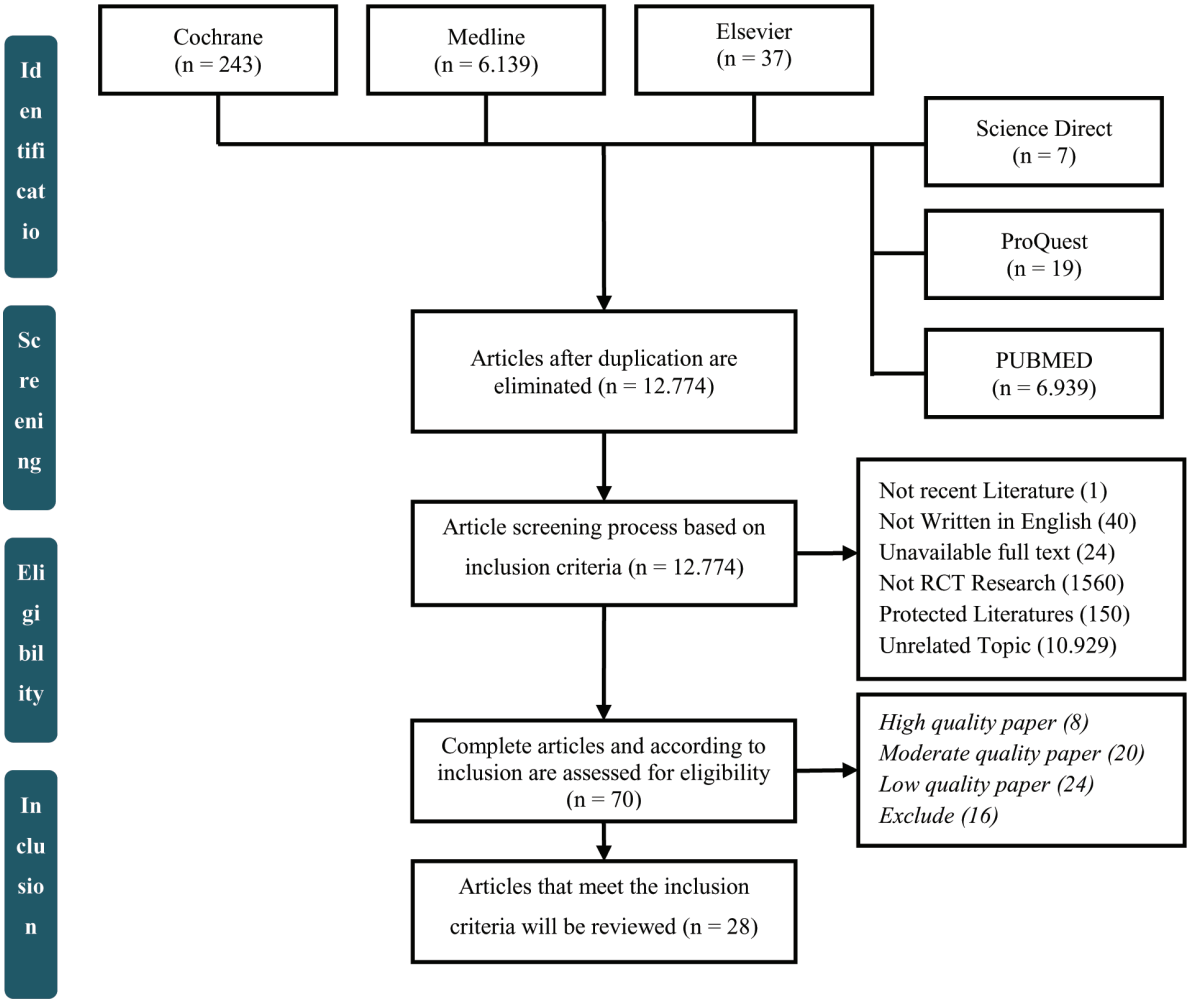

Figure 1. Article search selection.

or only women (13,14,20,26,29,37,38,42), most focused on adolescent girls women than teenage boys. The implementation of the intervention was found in urban areas (11-13,15-17, 19-22,24,26,27,34-44), as well as in rural areas (14,18,25,28) All distribution of the study focused on adolescents, mostly 13-17 years of age, although the lowest age of adolescents who received the intervention was 10 years and the highest was 19 years, and the study design used was a randomized trial (Randomized Controlled Trial, Randomized Clinical Trial, Cluster-Randomized Trial, Cluster Randomized Feasibility Trial, Double-Blind Cluster-RCT, Double-Blind Randomized Combined Prevention Trial, Multicentre Individual RCT, and Pragmatic Randomized Controlled Trial).

The sample size ranged from the lowest (n=107) to the largest (n=19,289). The outcomes in this study were behaviors: sexual activity (11-16,20,26,35-38,42,43), and contraceptive use (11,13-16,24,35-39,42,43), examining the impact on STI/HIV (11,13,15,20,35,36,38,43), knowledge and preventive behavior (11,17-19,21,22,24,26-28,34,35,38-40,43,44), and self-efficacy (24,29,39). Most of the study outcomes involved follow-up more than twice, the first follow-up was immediately after the intervention (26,39), 3 months (12,13,26,35,36), 6 months (11,13,29,35,39,42,43), 9 months (24,41), 12 months (17,24,37-39), 18 months (44), 24 months (26,36,42), even 7 years (15) after the intervention ended.

Thirty studies included in the data extraction, the identification results indicated that there were program interventions with evidence of effectiveness in reducing teenage pregnancy, STIs, or sexually-related risk behaviors, and there were interventions identified that did not show a statistically significant positive impact. The details of the study can be seen in Table I.

Discussion

This systematic review provides a comprehensive, updated assessment of the program with evidence of effectiveness in reducing teenage pregnancy, the occurrence of sexually transmitted infections, and risky sexual behavior. These findings indicate that various forms of intervention can reduce the risk, both school-based, clinic-based, and community-based interventions through the support of various parties (13). Programs to prevent teenage pregnancy, STIs and risky sexual behavior that are effective are divided into basic curriculum, learning services, organizational development, parenting programs and whole community programs (7).

The effect of the intervention continued to show changes in 13 of the 17 variables studied which showed higher levels of healthy sexual behavior (11). This influence is supported by the diversity of the interventions provided. Thus, the diversity of interventions carried out on adolescents also

Table I. Study characteristics.

No.	Authors/year	Country	Sample/population	Methods	Result	Quality	(Refs.)
1	Gómez-Lugo M, Morales A, Saavedra-Roa A, Niebles-Charris J, Abello-Luque D, Marchal-Bertrand L, García-Roncallo P, García-Montaño E, Pérez-Pedraza D, Espada JP, Vallejo-Medina P, 2022	Colombia	The sample is 2.047 from 2.708 adolescent population aged 12-19 years from a total of 13 SMA	Cluster-randomized trial	• Decreases were found in behavioral intentions to use condoms and attitudes towards HIV, particularly in relation to HIV protective behavior when faced with barriers • There was a significant positive difference in the percentage of condom use during penetrative sexual intercourse (AOR=7.52; 95% CI 0.41-16.62; P<0.05) and the number of lifetime sexual partners (AOR=1.46; 95% CI 1.02-2.08; P<0.05)	Moderate	(11)
2	D Morrison-Beedy, SH Jones, Y Xia, X Tu, HF Crean, MP Carey, 2013	Northeastern, New York, United States	The research sample is 738 adolescent girls aged 15-19 years who are sexually active and can speak English	Randomized controlled trial	Theory-based behavioral interventions tailored to adolescent girls can help reduce sexual risk and may also reduce unwanted pregnancies	Moderate	(13)
3	Stephenson J, Strange V, Allen E, Copas A, Johnson A, Bonell C, Babiker A, Oakley A, Brodala A, Charleston S, Flux A, Hambidge S, Johnston G, Monteiro H, Petruckevitch A, 2008	England	The research sample includes 27 schools with 8.766 students aged 13-14 years	Cluster-randomized trial	There were no significant differences for girls or boys in self-reported first unprotected sex, regretted or suppressed sex, quality ofcurrent sexual intercourse,diagnosed sexuallytransmitted disease, or ability to identify local sexual health services	Moderate	(15)

Table I. Continued.

No.	Authors/year	Country	Sample/population	Methods	Result	Quality	(Refs.)
4	Millanzi WC, Kibusi SM, Osaki KM, 2022	Tanzania	The study participants were 660 adolescents who were randomly selected from the population of school-aged adolescents 10-19 years old	Double-blinded clustered randomized controlled trial	• Soft skill coefficients were significantly higher among adolescents in the hybrid PBP and pure PBP than in the control group • Soft skills retention rates were still significantly higher at 3 and 6 months of follow-up compared to baseline and post-intervention assessments	Moderate	(35)
5	Parkes A, Wight D, Henderson M, Stephenson J, Strange V, 2009	London	The population includes all students (9.508) from 27 schools with a sample of 7.616 students	Double-blinded clustered randomized controlled trial	• Using condoms alone has a lower risk than without an effective method (OR: 2.97, 95% CI: 2.12-4.15) or OC alone (OR: 2.44, 95% CI: 1.29-4.60) • The risk of pregnancy for multiple use and emergency contraception is not different from that of condoms alone. Both effects are significant according to user characteristics and sexual activity	Moderate	(16)
6	Richard J Haier, Sherif Karama, Leonard Leyba, Rex E Jung, 2016	Prancis	400 samples from a population of HIV-negative men or transgender women who have sex with men, aged 18 years, at high risk of contracting HIV	Double-blind randomized combined prevention trial	• Results showed an 86% relative reduction (95% CI: 40-98) in HIV incidence among participants taking tenofovir disoproxil fumarate-emtricitabine vs. placebo • Comprehensive PrEP can improve prevention in MSM	Moderate	(36)

Table I. Continued.

No.	Authors/year	Country	Sample/population	Methods	Result	Quality	(Refs.)
7	Ladapo JA, Elliott MN, Bogart LM, Kanouse DE, Vestal KD, Klein DJ, Ratner JA, Schuster MA. J Adolesc Health, 2013	California Selatan	Study participants included 535 parents with children in grades 6-10 (approximately 11-16 years old) in 13 workplaces	Randomized controlled trial	• Cost effectiveness was $7.42 per new topic covered using parent responses and $9.18 using youth responses • Other efficacy results also result in a favorable cost-effectiveness ratio	Moderate	(41)
8	Sieving RE, McRee AL, McMorris BJ, Beckman KJ, Pettingell SL, Bearinger LH, Garwick AW, Oliphant JA, Plowman S, Resnick MD, Secor-Turner M., 2013	Minnesota United States	The sample is 253 girls aged 13-17 years who are sexually active and meet certain risk criteria	Randomized controlled trial	There was an improvement in family relationships and self-efficacy to resist unwanted sex, and a reduction in the perception of the importance of having sex	Moderate	(42)
9	Ekstrand M, Tydén T, Darj E, Larsson M., 2013	Sweden	420 Sample from a total of 667 female population aged 15-19 years	Randomized controlled trial	Girls in the intervention group reported a shorter time interval (mean 15.3 h) from unprotected intercourse to intake of ECP compared to the control group (mean 25.8 h) (P=0.019), with no evidence of decreased contraceptive use or increased sexual risk	Moderate	(37)
10	Letourneau EJ, McCart MR, Sheidow AJ, Mauro PM., 2017	United States	107 samples from 216 male adolescent population aged 11-17 years	Randomized controlled trial	• Intervention conditions did not differ significantly on adolescent demographic characteristics or baseline substance use, sexual risk, or HIV testing experience (all P-value<0.05) • The strong effect of the intervention was not detected in a study setting that included a strong background intervention by juvenile drug courts	Moderate	(38)

Table I. Continued.

No.	Authors/year	Country	Sample/population	Methods	Result	Quality	(Refs.)
11	Tingey L, Chambers R, Patel H, Littlepage S, Lee S, Lee A, Susan D, Melgar L, Slimp A, Rosenstock S. 2021	United States	534 samples from 703 adolescent population	Randomized controlled trial	Intervention participants had significantly more communication with their parents about sexual and reproductive health than control participants at 9 and 12 months (P=0.042 and P=0.001, respectively)	Moderate	(24)
12	Bauman LJ, Watnick D, Silver EJ, Rivera A, Sclafane JH, Rodgers CRR, Leu CS. 2021)	Bronx, New York	397 samples from 459 adolescent population aged 12-14 years	Randomized controlled trial	Program participation and completion rates, and sample retention did not differ by gender or age. However, the program effect was slightly stronger for boys than for girls	Moderate	(39)
13	Tebb KP, Rodriguez F, Pollack LM, Adams S, Rico R, Renteria R, Trieu SL, Hwang L, Brindis CD, Ozer E, Puffer M. 2021	Los Angeles (LA)	1,360 samples from 3,903 adolescent population	Cluster-randomized controlled trial	Intervention participants had higher rates of initial sexual activity, more recruitment visits for pregnancy testing, emergency contraception or birth control, and lower survey follow-up completion rates than controls	High	(26)
14	Nielsen AM, De Costa A, Gemzell-Danielsson K, Marrone G, Boman J, Salazar M, Diwan V. 2021	Stockholm, Sweden	433 samples from 972 adolescent population	Pragmatic randomized controlled trial	Consistent condom use was reported for 32/214 (15.0%) in the intervention group and for 35/219 (16.0%) in the control group (OR 0.9, 95% CI 0.5 to 1.6) and no significant differences in secondary outcomes were seen	High	(27)

Table I. Continued.

No.	Authors/year	Country	Sample/population	Methods	Result	Quality	(Refs.)
15	Lohan M, Brennan-Wilson A, Hunter R, Gabrio A, McDaid L, Young H, French R, Aventin Á, Clarke M, McDowell C, Logan D, Toase S, O'Hare L, Bonell C, Gillespie K, Gough A, Lagdon S, Warren E, Buckley K, Lewis R, Adara L, McShane T, Bailey J, White J. 2022	United Kingdom	The sample is 8,216 students/66 schools from a population of students aged 12-14 years and 803 schools	Cluster-randomized trial	Significantly more intervention students used reliable contraception at last sex compared to control students, there were no significant differences between groups for sexual abstinence and no side effects were reported	High	(17)
16	Lisa A. Marsch, Ph.D., Honoria Guarino, Ph.D., Michael J. Grabinski, M.C.S.D., Cassandra Syckes, M.A., Elaine T. Dillingham, B.A., Haiyi Xie, Ph.D., Benjamin S. Crosier, Ph.D. 2015	New York	141 samples from 208 population new patients (aged 12-18 years) entering outpatient drug abuse adolescents in three work locations	Randomized control trial	• Participants in the TES intervention achieved a significant increase in HIV knowledge, condom use efficacy, and condom skills and decreased risky sexual behavior in participants who received an intervention delivered by a prevention specialist • Participants are given a TES score that is easier to understand	High	(28)
17	Esther Duflo, Pascaline Dupas, Michael Kremer 2015	Kenya	The sample consisted of 19,289 students (9,487 girls and 9,802 boys) from 328 school populations in two districts	Cluster Randomized trial	• Education subsidies reduce adolescent dropout, pregnancy and marriage but not sexually transmitted infections (STIs) • The government's HIV curriculum, which emphasizes abstinence until marriage, does not reduce pregnancy or STIs • Government subsidies and HIV curricula reduce STIs more, but reduce dropout rates and fewer pregnancies, than subsidies for education alone	High	(18)

Table I. Continued.

No.	Authors/year	Country	Sample/population	Methods	Result	Quality	(Refs.)
18	Baird SJ, Garfein S, McIntosh CT, Ozler B. 2012	Malawi	1.289 Malawian women (13-22 years) who were never married and enrolled in school at the start of the study	Cluster randomized trial	• The cash transfer structural intervention alone is sufficient to influence behavior • In particular, young women in the intervention group were more likely to choose a younger partner and reported having less sex with that partner although the study found no effect on the frequency of unprotected sex. • After 18 months, HIV prevalence was reduced by 64% and HVS-2 was reduced by 76% by cash transfer, regardless of whether school attendance was required	High	(44)
19	Myra Taylor, Champak Jinabhai, Siyabonga Dlamini, Reshma Sathiparsad, Matthijs S. Eggers And Hein De Vries 2014	KwaZulu-Natal, South Africa	818 samples are randomly selected	Randomized control trial	Increased good attitude, including intention to abstain from pregnancy sex	High	(19)
20	Sally A Brinkman, Sarah E Johnson, James P Codde, Michael B Hart, Judith A Straton, Murthy N Mittinty, Sven R Silburn. 2016	Western Australia	The sample is 2.834 girls aged 13-15 years from 66 schools	Randomized control trial	• The proportion of girls in the intervention group was higher than in controls, recorded one birth (97 [8%] of 1267 in the intervention group vs. 67 [4%] of 1567 in the control group) and had a higher overall risk of pregnancy than the control group (relative risk 1:36 [95% CI 1 10-1, 67], P=0 003)		

Table I. Continued.

No.	Authors/year	Country	Sample/population	Methods	Result	Quality	(Refs.)
					• One abortion as the first pregnancy event (113 [9%] vs 101 [6%]) • The intervention group outcome was obtained using a hazard ratio of 1 35 [95% CI 1 10-1 67], P=0 016	Moderate	(20)
21	Amanda E. Tanner, PhD, MPH, Molly Secor-Turner, PhD, RN, Ann Garwick, PhD, RN, LP, FAAN, Renee Sieving, PhD, RN, and Kayci Rush, MSW, MA. 2012	University of North Carolina at Greensboro	Prime Time study participants were sexually active aged 13-17 years (253)	Uji coba acak Prime Time (2006-2011) dengan desain kualitatif	• Program staff described the different capacities of youth to engage with the program (sociable, middle and difficult youth) and made specific recommendations for working with different connectors. • Behaviors related to early pregnancy, building a trusting relationship is an important step towards building skills, motivation, opportunities and support for change	Moderate	(34)
22	Dev Acharya, Malcolm Thomas, Rosemary Cann. 2017	Nepal	The research sample is 448 students/4 schools from 482 high school students aged 14-18 years old	Randomised control trial	• There is a large number of school children who report an increase in sexual health knowledge in experimental schools • Facilitators who lead sex education programs are more effective in increasing sexual health knowledge about school children	Moderate	(21)
23	Maria Lohan, A´ine Aventin, Lisa Maguire, Mike Clarke, Mark Linden, Lisa McDaid. 2014	Queen's University Belfast	630 students from 7 schools are the sample with the target population being male	Cluster randomised feasibility trial	• An acceptable and effective intervention has the potential to be rolled out to a large number of boys	Moderate	(22)

Table I. Continued.

No.	Authors/year	Country	Sample/population	Methods	Result	Quality	(Refs.)
			teenagers aged 14-16 years		and girls. Generalizable findings especially with regard to gender-specific adolescent pregnancy interventions • School-based RSE is an important opportunity to open up understanding of sexuality and unwanted pregnancies between boys and girls, but maximizing this opportunity requires developing acceptable and effective RSE resources		
24	Karin K. Coyle, Ph.D., Jill R. Glassman, Ph.D., Heather M. Franks, M.A., Shannon M. Campe, Jill Denner, Ph.D., and Gina M. Lepore. 2013	Hispanic/ Latino or African-American	765 samples from 899 student population	Randomized control trial	• Participants were 53% male (mean age: 16.2 years) with the majority of youth Hispanic/Latino or African-American (37.9 and 22.3%) • Students in HIV/STI/ pregnancy prevention curriculum conditions tended to have unprotected vaginal sex in the 3 months prior to the survey [odds ratio (OR) .58, p .04] • The program significantly reduces students' exposure to risk situations • This change was not significant in service learning alone or in the combined intervention conditions relative to controls	Moderate	(12)

Table I. Continued.

No.	Authors/year	Country	Sample/population	Methods	Result	Quality	(Refs.)
25	Jennifer Green, M.P.H., Ph.D, Roy F. Oman, Ph.D, Minggen Lu, Ph.D., and Kristen D. Clements-Nolle, Ph.D. 2017	California, Maryland, and Oklahoma	1,036 ethnically diverse adolescents (aged 13-18 years) were recruited from 44 residential homes in three states	Randomized control trial	Adolescents in the PTC intervention showed significantly increased knowledge compared to the control group about anatomy and fertility (adjusted odds ratio [AOR] 1.07, 95% confidence interval [CI] 1.03-1.11), HIV and STIs (AOR 1, 03, 95% CI 1.002-1.07), and methods of protection (AOR 1.06, 95% CI 1.03-1.09), and self-efficacy regarding self-efficacy to communicate with partners (AOR 1.14, 95% CI 1.04-1.26), plans to protect against sex and avoid unprotected sex (AOR 1.16, 95% CI 1.04-1.28), and where to get a method of birth control (AOR 1.13, 95% CI 1.01-1.26) 12 months after intervention	Moderate	(43)
26	Chris Bonell , Ruth Maisey , Svetlana Speight , Susan Purdon, Peter Keogh, Ivonne Wollny, Annik Sorhaindo, Kaye Wellings 2013	England, UK	The research sample is 404 girls	Randomized trial dengan matched pair individual	• There is no evidence of intervention benefits for our primary outcomes and positive impact for our secondary outcomes • Outcomes: low self-esteem, low knowledge of sexual health, and difficulty discussing contraceptive pills	Moderate	(40)

Table I. Continued.

No.	Authors/year	Country	Sample/population	Methods	Result	Quality	(Refs.)
					• Interventions should be refined, with clearer logical models and more emphasis on sex education, and re-evaluated		
27	Nandita Kapadia-Kundu, Douglas Storey, Basil Safi, Geetali Trivedi, Rama Tupe, G. Narayana d. 2014	India	A sample of 1.200 girls was randomly selected, 1.195 eligible girls were randomized to 3 groups	Cluster randomized control trial	• Interventions have a significant impact on more than 13 preventive health behaviors • Approximately 65% of girls in the intervention group had adopted 13 or more health behaviors at the end-line compared to 4.5 percent in the control group at the end-line and 5 percent at baseline. • Behavioral impacts are demonstrated in all three areas of nutrition, hygiene and reproductive health	Moderate	(14)
28	Julie S. Downs, PhD , Amie M. Ashcraft, PhD, MPH , Pamela J. Murray, MD, MHP , Elise D. Berlan, MD, Wändi Bruine de Bruin, PhD , Joan Eichner, MPA, MPH, Baruch Fischhoff, PhD, Janie A. Leary, PhD, MPH , Robert B. McCall, PhD , Elizabeth Miller, MD, Jennifer Salaway, PhD, Janell Smith-Jones, PhD , Gina S. Sucato, MD, MPH. 2017	Carnegie Mellon University, Department of Social and Decision Sciences,	1.317 samples from 2.814 population of sexually active adolescent girls aged 14-19 years	Multicenter individual RCT	• Participants in the Seventeen Days group reported higher gains in self-efficacy after 6 months compared to the control group in 2008 • This finding was carried out after controlling for baseline self-efficacy scores and other covariates	High	(29)

strongly proves that the focus of the study covers a wide range of settings. Research has been carried out with programs ranging from curriculum-based and individual sexuality education programs, to clinic-based services, in settings ranging from schools to communities. This diversity is important because no single intervention that is successful in improving adolescent health must be comprehensive, there are variations in the various interventions implemented. It is appropriate that comprehensive Pre-exposure Prophylaxis (PrEP) can improve prevention in MSM (36). In addition, diversity is important to meet the interests of the community, where there is no appropriate intervention model for varying populations, it must be adapted to the characteristics (school settings have different program needs with needs in the clinic and in the community). Youth interventions in rural areas will also be different from interventions developed in urban areas. Similarly, youth in rural areas may respond differently to programs originally developed in urban areas. For example, intervention participants reported improvements in family relationships as well as self-efficacy for resisting unwanted sex (42). Each population and setting has distinctive characteristics it is essential to have a variety of programs available for implementation, requiring research outcomes that have a broad focus. The diversity of the target population is important to determine effective interventions for all adolescents (Latin, Hispanic, African, etc.) (12,19,26).

Compared with adolescents in the control group, adolescents in the Power Through Choices (PTC) intervention showed a significant increase in knowledge about anatomy and fertility (43). This shows that interventions from several programs show potentially significant effects in general, namely teenage pregnancy, STIs, and risky sexual behavior but show differences in several outcome measurement variables. Potential productive strategies have an impact on the success of interventions and improving adolescent health status (preventing teenage pregnancy, STIs, risky sexual behavior) can reduce public health problems, reduce all risk factors for adolescent health problems. The implementation of this can be seen from the medical record audit for girls recruited from clinical settings (n=322) documenting a 50% reduction in positive pregnancy tests at 12 months (13).

The outcome of the intervention is observed within a certain period of time in accordance with the objectives of each program with an average observation of 3 months-2 years. Long-term research using questionnaires and observation instruments requires the use of accurate data, so it needs to be considered when analyzing data according to needs, both short-term data and long-term data (18). The use of i-surveys to strengthen the evidence that interventions have short-term (skills, attitudes, and intentions) and long-term impacts are often better for measuring impacts on behavior or health outcomes, which take longer. Future research should more carefully consider the appropriate time for follow-up surveys. Most current teen pregnancy and STI prevention programs are built on predictions of both the short-term impact on sexual activity or contraceptive use and the long-term impact on pregnancy or STIs (12). However, there are studies that examine the impact on short-term outcomes such as pregnancy and STIs. To allow broader testing of the impact of the program, researchers should consider a follow-up schedule for example using three relatively short surveys (immediate post-test and at 6 and 12 months post intervention), researchers can administer two surveys, one short term (6 months postprogram). and long term (18-24 months postprogram).

Quality control tools for research would be useful to avoid bias in the population: 1) Randomized designs should use objective results (accurate evidence), 2) Develop evaluation tools for randomized studies and systematic reviews taking into account the distinction between subjective and objective outcomes of assessments, 3) Program makers intervention should develop interventions that are supported by evidence from high-quality randomized studies that show real and large effects should study the interventions and policies implemented to manage health problems, especially adolescent pregnancy prevention that have shown real effects, in addition to reviewing educational strategies used in groups social status with teenage pregnancy rates (13,14). These findings strongly suggest that the use of randomized trials is a realistic expectation, the literature on teenage pregnancy and STI prevention, and the foundation on which future research should be built.

Strenghs and limitations. Search strategy adapted to the research question, a large number of articles related to the topic of the research question, limited access. The relevant literature spans the disciplines of medicine, public health, demography, psychology, economics, sociology, and other social sciences, where relevant search terms may vary. Manually reviewing titles and abstracts to determine whether studies meet inclusion criteria, it is possible to skip those articles where the intervention is not explicitly identified in the title or abstract. Limiting studies to English only excluding relevant studies written in other languages. Bias can be found in the types of outcomes reported, intentional or unintentional selective reporting due to the nature of the intervention and the desire to demonstrate a positive effect. Similar forces can affect the likelihood of publication in an indexed journal. The quality and completeness of the evidence is not accessed directly by contacting the author. The studies included in this review represent only a fraction of the total global effort to reduce pregnancy over the past fourteen years, and it is likely that programs of very good quality are not within the time limit of the search.

Conclusions

This article reviews the scope and quality of the existing literature on interventions to reduce adolescent pregnancy and risky sexual behavior. This article describes some basic trends in adolescent pregnancy prevention interventions in several countries that can be used as a reference for health programs. Adolescent pregnancy prevention interventions are directed primarily at programs that have evidence of effectiveness. Unproven effectiveness can be implemented in conjunction with other interventions that have a high-quality impact.

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Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Authors' contributions

EG, screening and data extraction, quality assessment; A, reviewed the systematic review; BW, corrected the manuscript of the article, corrected data analysis and interpretation; ZS, reviewed the systematic review. All the authors have read and approved the final version of the manuscript and agreed to be held accountable for all aspects of the work.

Conflict of interest

The authors declare no potential conflict of interest.

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